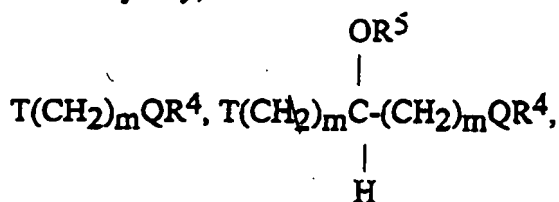


cycloalkyl, C₂-C₁₀ alkenyl, and C₂-C₁₀ alkynyl, wherein n is 0, 1, 2, or 3, and the (CH₂)_nAr, (CH₂)_nheteroaryl, alkyl, cycloalkyl, alkenyl, and alkynyl groups are optionally substituted by up to 5 groups selected from NR⁴R⁵, N⁺(O)R⁴R⁵, N⁺R⁴R⁵R⁶Y⁻, alkyl, phenyl, substituted phenyl, (CH₂)_nheteroaryl, hydroxy, alkoxy, phenoxy, thiol, thioalkyl, halo, COR⁴, CO₂R⁴, CONR⁴R⁵, SO₂NR⁴R⁵, SO₃R⁴, PO₃R⁴, aldehyde, nitrile, nitro, heteroaryloxy,



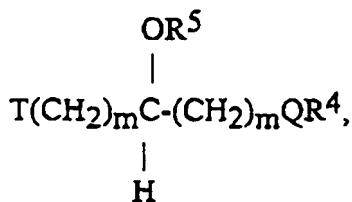
C(O)T(CH₂)_mQR⁴, NH₂C(O)T(CH₂)_mQR⁴, T(CH₂)_mC(O)NR⁴NR⁵, or T(CH₂)_mCO₂R⁴ wherein each m is independently 1-6, T is O, S, NR⁴, N⁺(O)R⁴, N⁺R⁴R⁶Y⁻, or QR⁴R⁵, and Q is O, S, NR⁵, N⁺(O)R⁵ or N⁺R⁵R⁶Y⁻;

and additionally alkyl, alkenyl and alkynyl can be further substituted with one to three cycloalkyl groups,

when the dotted line is present, R³ is absent;

otherwise R³ has the meanings of R², wherein R² is as defined above, as well as OH, NR⁴R⁵, COOR⁴, OR⁴, CONR⁴R⁵, SO₂NR⁴R⁵, SO₃R⁴, PO₃R⁴,

T(CH₂)_mQR⁴,



wherein T and Q are as defined above;

R⁴ and R⁵ are each independently selected from the group consisting of hydrogen, C₁-C₆ alkyl, substituted alkyl, C₂-C₆ alkenyl, C₂-C₆ alkynyl, N(C₁-C₆alkyl)₁ or 2, (CH₂)_nAr, C₃-C₁₀ cycloalkyl, heterocyclyl, and

heteroaryl, or R⁴ and R⁵ together with the nitrogen to which they are attached optionally form a ring having 3 to 7 carbon atoms and said ring optionally contains 1, 2, or 3 heteroatoms selected from the group consisting of nitrogen, substituted nitrogen, oxygen, and sulfur;

when R⁴ and R⁵ together with the nitrogen to which they are attached form a ring, the said ring is optionally substituted by 1 to 3 groups selected from OH,

OR⁴, NR⁴R⁵, (CH₂)_mOR⁴, (CH₂)_mNR⁴R⁵, T-(CH₂)_mQR⁴,
CO-T-(CH₂)_mQR⁴, NH(CO)T(CH₂)_mQR⁴, T-(CH₂)_mCO₂R⁴, or
T(CH₂)_mCONR⁴R⁵;

R⁶ is alkyl;

R⁸ and R⁹ independently are H, NR⁴R⁵, N⁺(O)R⁴R⁵, N⁺R⁴R⁵R⁶Y⁻, COR⁴,
CO₂R⁴, CONR⁴R⁵, SO₂NR⁴R⁵, SO₃R⁴, PO₃R⁴, CN or nitro;

when the dotted line is absent, R⁹ can additionally
be = NOH,

= NOalkyl, =NOalkenyl, =NOalkynyl or =NOcycloalkyl;

and

Y is a halo counter-ion;

with the proviso that: (a) when R⁸ and R⁹ are both hydrogen, W is NH, R¹ is hydrogen
and X is NR¹⁰, then R¹⁰ is neither unsubstituted (C₁-C₁₀) alkyl, unsubstituted (C₁-C₁₀)
alkenyl nor unsubstituted (C₁-C₁₀) alkynyl;

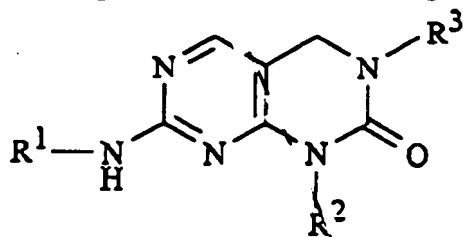
(b) when R⁸ or R⁹ is NR⁴R⁵, N⁺(O)R⁴R⁵, or N⁺R⁴R⁵R⁶Y⁻, then one or more of R⁴, R⁵ and
R⁶ must be, independent of the nitrogen to which said one or more R⁴, R⁵ and R⁶ are
attached, heterocyclic or heteroaryl; and

(c) when R⁸ or R⁹ is COR⁴, CO₂R⁴, CONR⁴R⁵, SO₂NR⁴R⁵, SO₃R⁴ or PO₃R⁴, then one or
more of R⁴, R⁵ and R⁶ must be, independent of the nitrogen to which said one or more R⁴,
R⁵ and R⁶ are attached, (CH₂)_naryl wherein n is zero, 1, 2 or 3, heterocyclic or heteroaryl;

(d) when X is S and W is NH, then at least one of R¹, R², R³, R⁸ and R⁹ is other than H
or C₁-C₃ alkyl

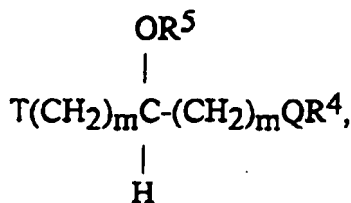
55. A compound of Claim 54, wherein W is NH, and R⁸ and R⁹ both are hydrogen.

56. A compound of Claim 55 having the formula



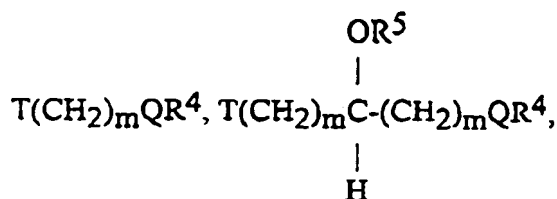
wherein:

R^1 and R^2 independently are hydrogen, C_1 - C_{10} alkyl, $(CH_2)_n$ Ar, $(CH_2)_n$ heteroaryl, C_3 - C_{10} cycloalkyl, or $(CH_2)_n$ heterocyclyl, wherein n is 0, 1, 2 or 3, and the $(CH_2)_n$ Ar, $(CH_2)_n$ heteroaryl, alkyl, cycloalkyl and $(CH_2)_n$ heterocyclyl groups are optionally substituted by up to 5 groups selected from NR^4R^5 , $N^+(O)R^4R^5$, $N^+R^4R^5R^6Y^-$, alkyl, phenyl, substituted phenyl, $(CH_2)_n$ heteroaryl, hydroxy, alkoxy, phenoxy, thiol, thioalkyl, halo, COR^4 , CO_2R^4 , $CONR^4R^5$, $SO_2NR^4R^5$, SO_3R^4 , PO_3R^4 , aldehyde, nitrile, nitro, heteroaryloxy, $T(CH_2)_mQR^4$,



$NHC(O)T(CH_2)_mQR^4$, $T(CH_2)_mC(O)NR^4R^5$, or $T(CH_2)_mCO_2R^4$ wherein each m is independently 1-6, T is O, S, NR^4 , $N^+(O)R^4$, $N^+R^4R^6Y^-$, or CR^4R^5 , and Q is O, S, NR^5 , $N^+(O)R^5$, or $N^+R^5R^6Y^-$;

R^3 has the meanings of R^2 , wherein R^2 is as defined above, as well as OH, NR^4R^5 , $COOR^4$, OR^4 , $CONR^4R^5$, $SO_2NR^4R^5$, SO_3R^4 , PO_3R^4 ,



wherein T and Q are as defined above;

R^4 and R^5 are each independently selected from the group consisting of hydrogen, C_1 - C_6 alkyl, substituted alkyl, C_2 - C_6 alkenyl, C_2 - C_6 alkynyl, $N(C_1$ - C_6 alkyl) $_1$ or $_2$, $(CH_2)_n$ Ar, C_3 - C_{10} cycloalkyl, heterocyclyl, and heteroaryl, or R^4 and R^5 together with the nitrogen to which they are attached optionally form a ring having 3 to 7 carbon atoms and said ring optionally contains 1, 2, or 3 heteroatoms selected from the group consisting of nitrogen, substituted nitrogen, oxygen, and sulfur;

when R^4 and R^5 together with the nitrogen to which they are attached form a ring, the said ring is optionally substituted by 1 to 3 groups selected from OH, OR^4 , NR^4R^5 , $(CH_2)_mOR^4$, $(CH_2)_mNR^4R^5$, $T-(CH_2)_mQR^4$,

$CO-T-(CH_2)_mQR^4$, $NH(CO)T-(CH_2)_mQR^4$, $T-(CH_2)_mCO_2R^4$, or

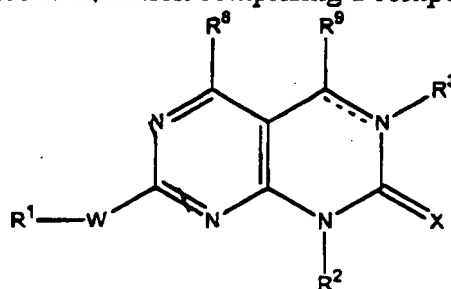
$T(CH_2)_mCONR^4R^5$;

R^6 is alkyl; and

Y is a halo counter-ion.

57. A compound of Claim 54 wherein W is S, SO, or SO_2 .

58. A pharmaceutical formulation comprising a compound of compound of Formula I



I

or a pharmaceutically acceptable salt thereof,

wherein:

the dotted line represents an optional double bond;

W is NH, S, SO, or SO_2 ;

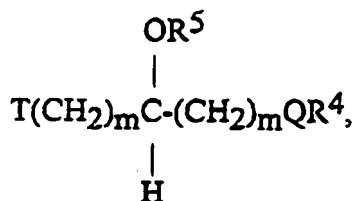
X is either O, S, or NR^{10} ;

R^1 , R^2 , and R^{10} are independently selected from the group consisting of H, $(CH_2)_n$ Ar, COR^4 , $(CH_2)_n$ heteroaryl, $(CH_2)_n$ heterocyclyl, C_1 - C_{10} alkyl, C_3 - C_{10} cycloalkyl, C_2 - C_{10} alkenyl, and C_2 - C_{10} alkynyl, wherein n is 0, 1, 2, or 3, and the $(CH_2)_n$ Ar, $(CH_2)_n$ heteroaryl, alkyl, cycloalkyl, alkenyl, and alkynyl groups are optionally substituted by up to 5 groups selected from NR^4R^5 , $N^+(O)R^4R^5$, $N^+R^4R^5R^6Y^-$, alkyl, phenyl, substituted phenyl, $(CH_2)_n$ heteroaryl, hydroxy,

alkoxy, phenox~~y~~, thiol, thioalkyl, halo, COR⁴, CO₂R⁴, CONR⁴R⁵, SO₂NR⁴R⁵, SO₃R⁴, PO₃R⁴, aldehyde, nitrile, nitro,

heteroaryloxy,

T(CH₂)_mQR⁴,

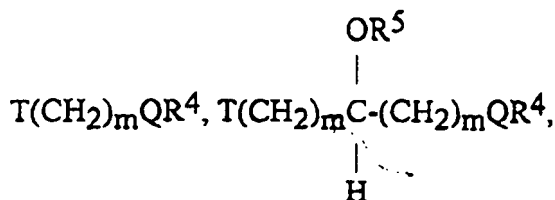


C(O)T(CH₂)_mQR⁴, NHC(O)T(CH₂)_mQR⁴, T(CH₂)_mC(O)NR⁴NR⁵, or T(CH₂)_mCO₂R⁴ wherein each m is independently 1-6, T is O, S, NR⁴, N⁺(O)R⁴, N⁺R⁴R⁶Y⁻, or CR⁴R⁵, and Q is O, S, NR⁵, N⁺(O)R⁵ or N⁺R⁵R⁶Y⁻;

and additionally alkyl, alkenyl and alkynyl can be further substituted with one to three cycloalkyl groups,

when the dotted line is present, R³ is absent;

otherwise R³ has the meanings of R², wherein R² is as defined above, as well as OH, NR⁴R⁵, COOR⁴, OR⁴, CONR⁴R⁵, SO₂NR⁴R⁵, SO₃R⁴, PO₃R⁴,



wherein T and Q are as defined above;

R⁴ and R⁵ are each independently selected from the group consisting of hydrogen, C₁-C₆ alkyl, substituted alkyl, C₂-C₆ alkenyl, C₂-C₆ alkynyl, N(C₁-C₆alkyl)₁ or 2, (CH₂)_nAr, C₃-C₁₀ cycloalkyl, heterocycl_yl, and heteroaryl, or R⁴ and R⁵ together with the nitrogen to which they are attached optionally form a ring having 3 to 7 carbon atoms and said ring optionally

contains 1, 2, or 3 heteroatoms selected from the group consisting of nitrogen, substituted nitrogen, oxygen, and sulfur;

when R^4 and R^5 together with the nitrogen to which they are attached form a ring, the said ring is optionally substituted by 1 to 3 groups selected from OH, OR^4 , NR^4R^5 , $(CH_2)_mOR^4$, $(CH_2)_mNR^4R^5$, $T-(CH_2)_mQR^4$,

$CO-T-(CH_2)_mQR^4$, $NH(CO)T(CH_2)_mQR^4$, $T-(CH_2)_mCO_2R^4$, or $T(CH_2)_mCONR^4R^5$;

R^6 is alkyl;

R^8 and R^9 independently are H, NR^4R^5 , $N^+(O)R^4R^5$, $N^+R^4R^5R^6Y^-$, COR^4 , CO_2R^4 , $CONR^4R^5$, $SO_2NR^4R^5$, SO_3R^4 , PO_3R^4 , CN or nitro;

when the dotted line is absent, R^9 can additionally be = NOH,

= NOalkyl, = NOalkenyl, = NOalkynyl or = NOcycloalkyl;

and

Y is a halo counter-ion;

with the proviso that: (a) when R^8 and R^9 are both hydrogen, W is NH, R^1 is hydrogen and X is NR^{10} , then R^{10} is neither unsubstituted (C_1 - C_{10}) alkyl, unsubstituted (C_1 - C_{10}) alkenyl nor unsubstituted (C_1 - C_{10}) alkynyl; and

(b) when R^8 or R^9 is NR^4R^5 , $N^+(O)R^4R^5$, $N^+R^4R^5R^6Y^-$, COR^4 , CO_2R^4 , $CONR^4R^5$, $SO_2NR^4R^5$, SO_3R^4 or PO_3R^4 , then one or more of R^4 , R^5 and R^6 must be, independent of the nitrogen to which said one or more of R^4 , R^5 and R^6 is attached, $(CH_2)_n$ aryl wherein n is zero, 1, 2, or 3, heterocyclic or heteroaryl;

(c) when X is S and W is NH, then at least one of R^1 , R^2 , R^3 , R^8 and R^9 is other than H or C_1 - C_3 alkyl;

in combination with a pharmaceutically acceptable carrier, diluent, or excipient.

59. A pharmaceutical formulation comprising a compound of Claim 56 in combination with a pharmaceutically acceptable carrier, diluent or excipient. - -